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SS-06: Physics-Informed Machine Learning For Reliability, Availability, Maintainability and Safety (RAMS)

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Description

The effective use of Machine Learning within frameworks for the assessment in practice of system Reliability Availability Maintainability and Safety (RAMS) is often limited by various factors, i.e., data scarcity, physics-inconsistency, unsatisfactory performance, etc. To overcome these limitations, Physics-Informed Machine Learning (PIML) has been developed to integrate physics-based laws into the Machine Learning models.

PIML promises accurate predictions and alignment with real-world system behavior, enabling robust, trustworthy and generalizable AI solutions for RAMS applications. This special session aims to convene experts from academia and industry to share recent advancements in PIMLs, and their specific applications to RAMS across various industries.

Topics of Interest

Methods:

- Physics-informed Neural Networks
- Physics-Informed Data Augmentation
- Physics-Informed Architecture Design
- Physics-Informed Loss Function

Applications:

- Multi-Scale Modeling
- Surrogate modeling
- Sensitivity Analysis
- Parameter Estimation
- System Optimization
- Anomaly Detection
- Fault Diagnostics
- Fault Prognostics
- Predictive Maintenance